

(No Model.)

N. T. GREENE.  
EXHAUST VALVE FOR ENGINES.

No. 424,605.

Patented Apr. 1, 1890.

FIG. 1.

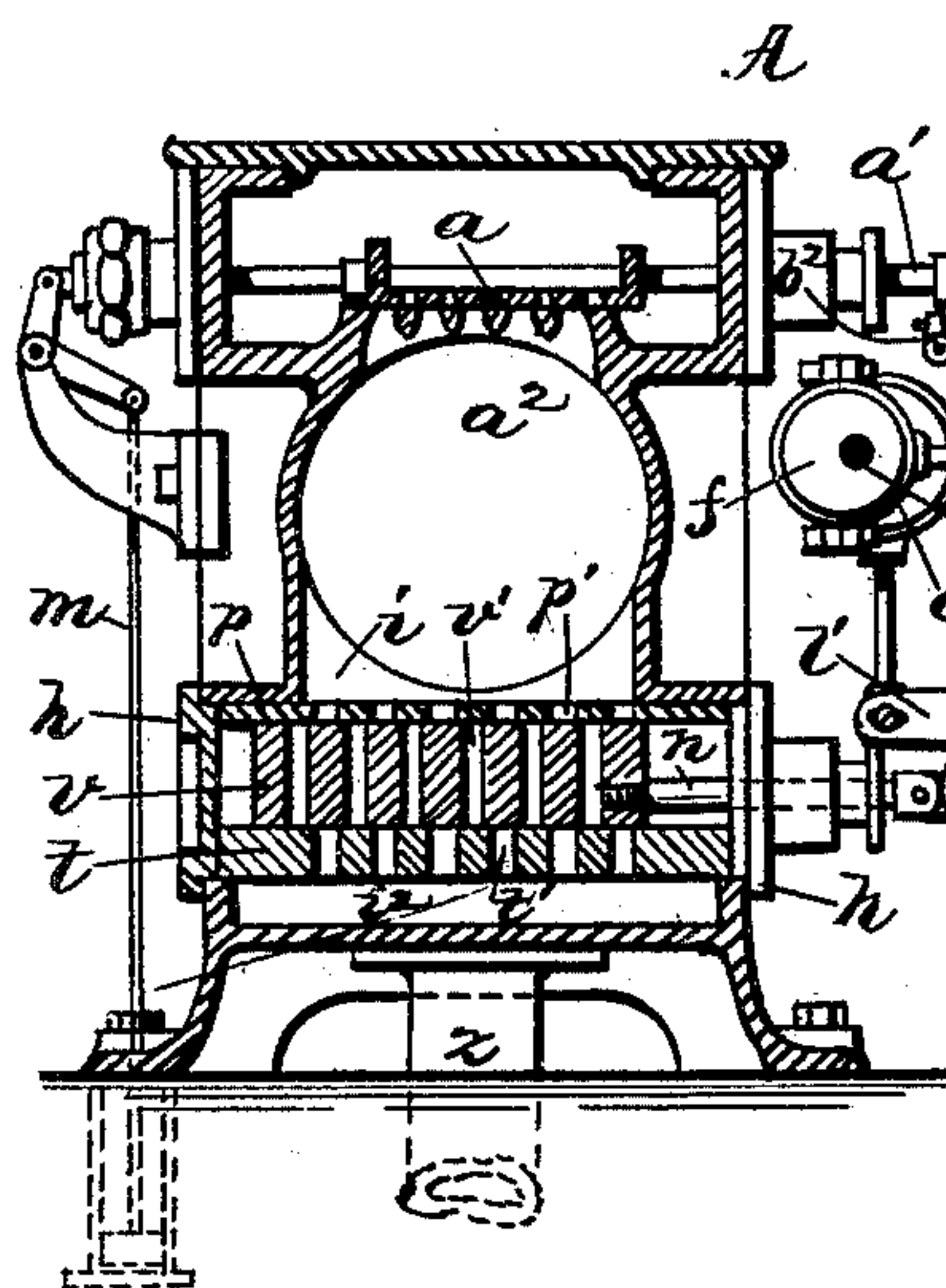


FIG. 2.

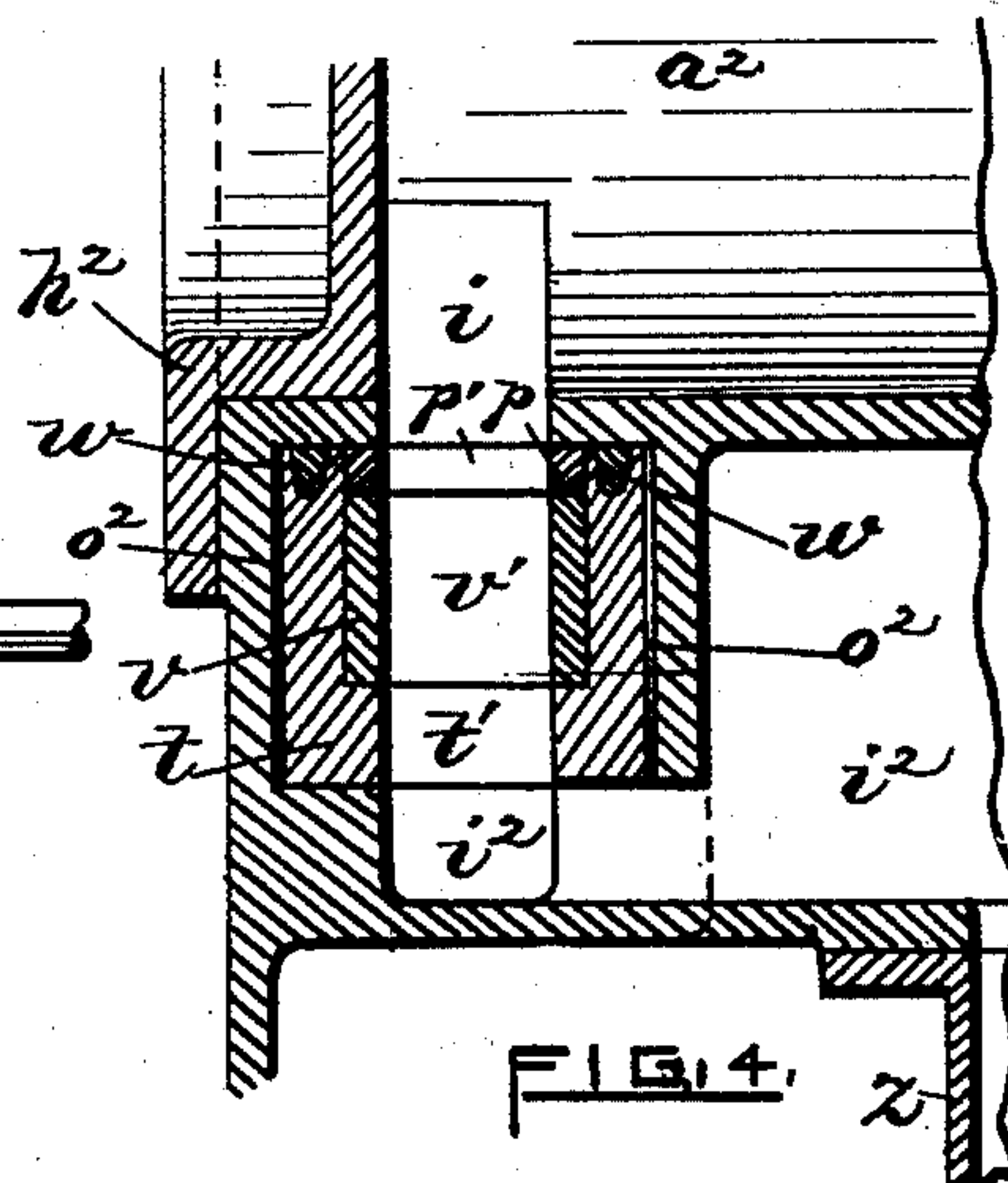
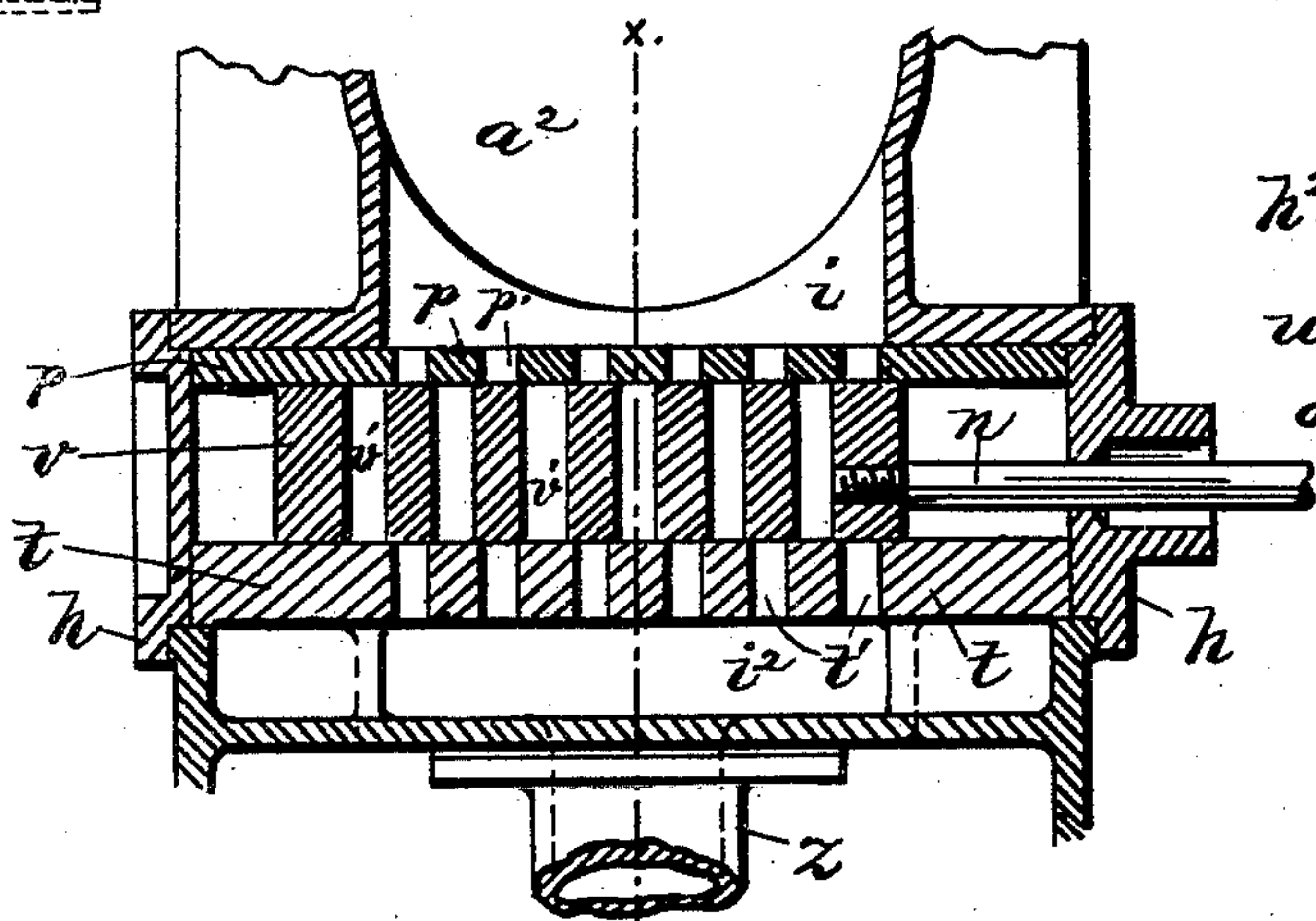
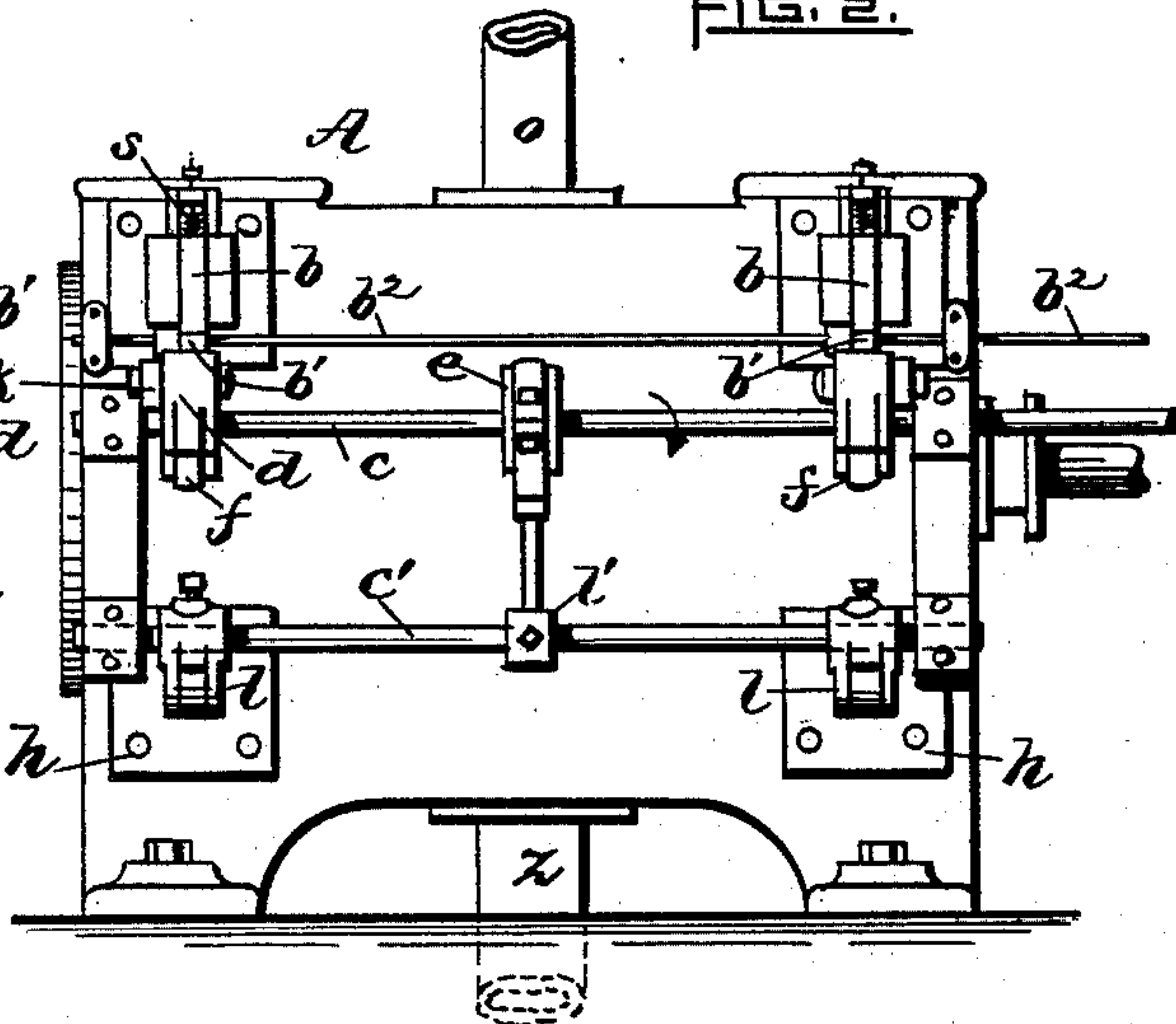


FIG. 3.

FIG. 4.

FIG. 5.

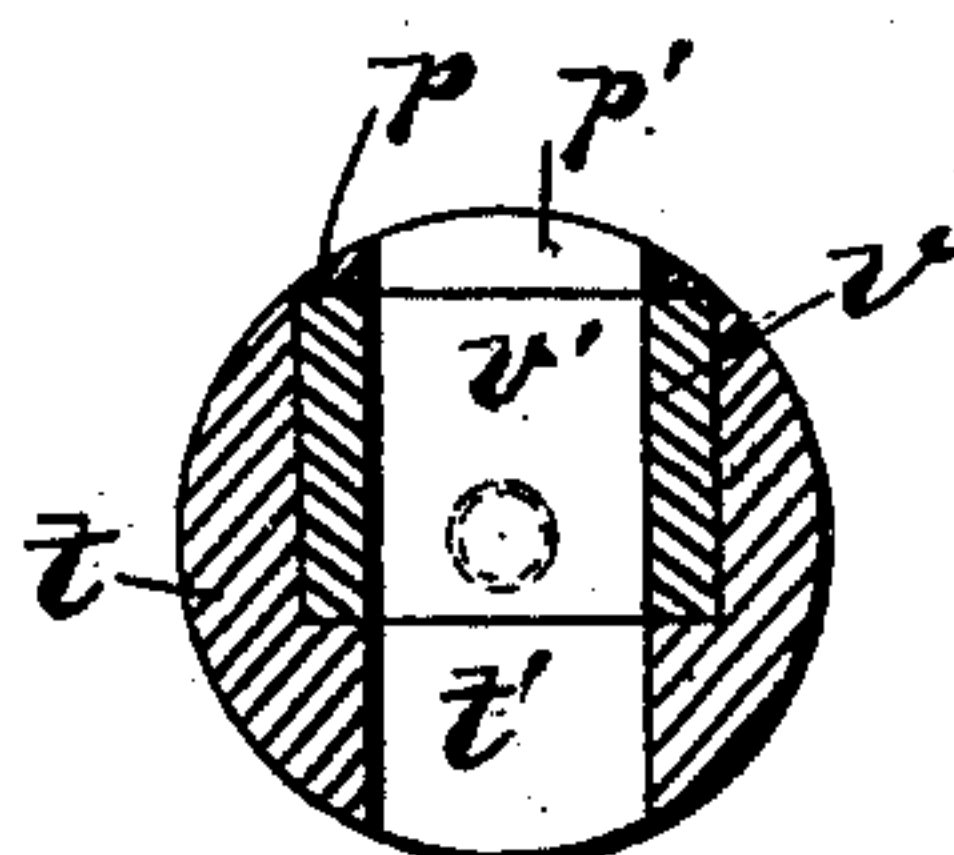
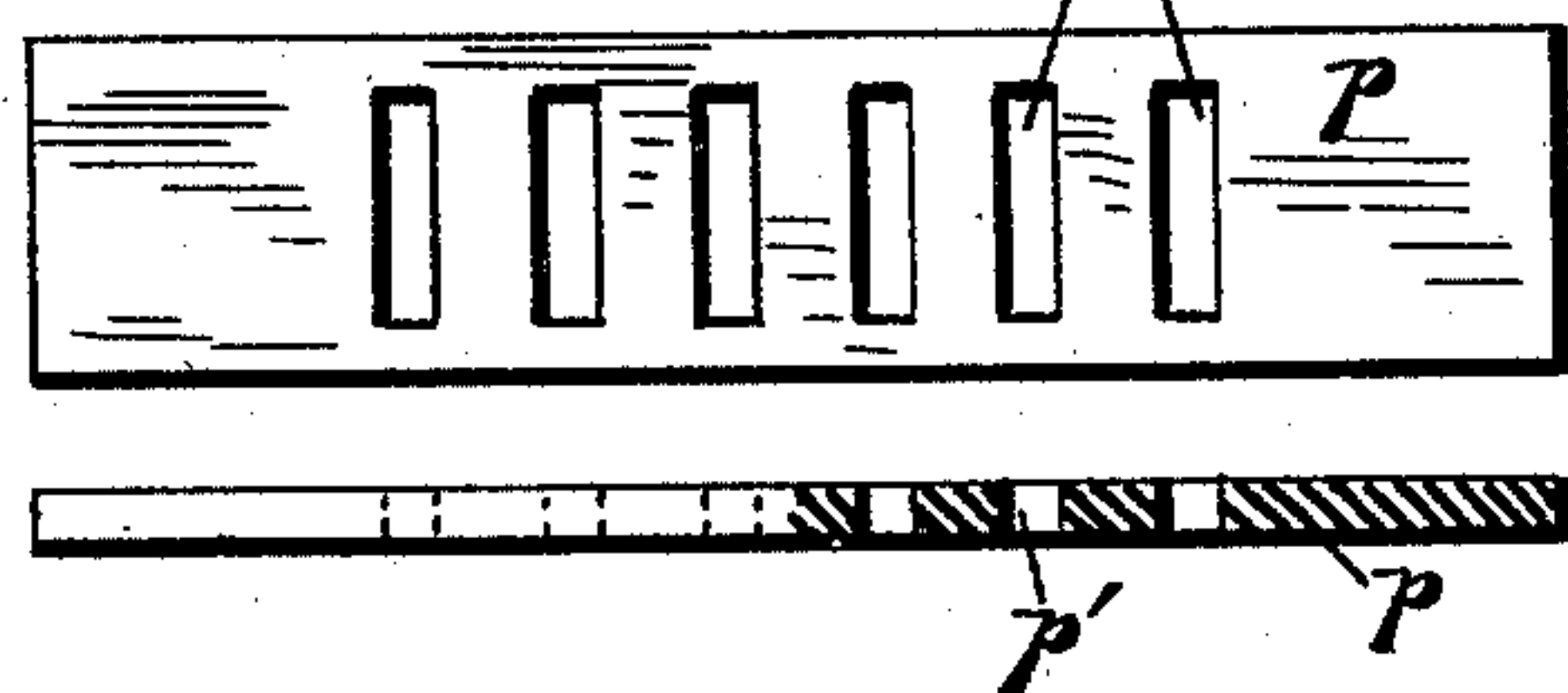


FIG. 6.

WITNESSES.

*Charles Hannigan.*

*Albert W. Dakin.*

INVENTOR.

*Noble T. Greene.*

*By Remington J. Hathorn*  
*Attys*



# UNITED STATES PATENT OFFICE.

NOBLE T. GREENE, OF PROVIDENCE, RHODE ISLAND.

## EXHAUST-VALVE FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 424,605, dated April 1, 1890.

Application filed October 26, 1889. Serial No. 328,268. (No model.)

*To all whom it may concern:*

Be it known that I, NOBLE T. GREENE, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Exhaust-Valves for Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

The object of my invention is mainly to reduce the clearance or space present in the exhaust-passages of the cylinders of steam-engines, more particularly in the class of cut-off engines.

To that end my invention consists, essentially, of a cylinder adapted to receive a removable seat provided with exhaust-ports, a gridiron or register valve fitted to travel to and fro therein, and a ported plate covering the valve.

By means of my improvement the waste room or space at each end of the steam-cylinder contiguous to the exhaust-valve is greatly reduced from the fact that during the admission of live steam into the cylinder such steam is excluded from the ports of the closed exhaust-valve by reason of the stationary plate covering the top face of the valve, thereby saving at each stroke of the piston a volume of steam equal to the capacity of the exhaust-valve's ports.

Another advantage of my invention is that in fitting the valve-seat to the cylinder the labor is greatly reduced, as will be more fully hereinafter set forth and claimed.

In the accompanying drawings, Figure 1 is a transverse sectional view taken through a steam-engine cylinder provided with my improvement. Fig. 2 is a side elevation viewed from the back side of the cylinder. Fig. 3 is an enlarged transverse sectional view taken through the lower portion of the cylinder and exhaust-valve. Fig. 4 is a partial longitudinal sectional view taken through line  $xx$  of Fig. 3. Fig. 5 represents side and plan views of the ported covering-plate; and Fig. 6 is a

transverse sectional view of a modified form of an exhaust-valve, seat, and plate.

The following is a more detailed description of my invention.

I will first briefly describe a manner of operating the steam-valves of the steam-cylinder provided with a detachable or liberating valve-gear.

The steam or gridiron valves  $a$  are fitted to travel crosswise of the cylinder  $A$ , motion being imparted to them by a suitably-mounted revolving shaft  $c$ , carrying independent eccentrics  $f$ , which vibrate tappet-carrying levers or arms  $d$ , mounted on stationary pins  $k$  longitudinally of the cylinder. The tappets  $b'$  engage the lower ends of latches  $b$ , each mounted to travel up and down in a head or frame secured to the rear end of the valve-stem  $a'$ , thereby when in operation forcing the steam-valve endwise to uncover the port and admit steam into the cylinder. A governor-actuated rod  $b^2$  is provided with cams or tripping-blocks engaging said latches, thereby controlling and limiting the downward movement of the latches and determining the point of cut-off. At the instant that the tappet in its forward curvilinear movement passes from contact with the latch, the steam-port thereby being correspondingly uncovered, a weight or dash-pot piston, jointed to the rod  $m$ , immediately falls, and through the medium of suitable levers or connections attached to the front end of the valve-rod forces the steam-valve rearwardly, thereby automatically cutting off the steam from that end of the cylinder, the operation being repeated alternately at each end of the cylinder during each revolution of the engine.

The exhaust-valve and its mechanism, which constitute my present invention, will be next described. The exhaust-valves  $v$  are multiported, being sometimes termed "gridiron-valves," and are fitted to travel to and fro across the lower portion of the cylinder. The exhaust-ports  $i$  communicate each with a large square or rectangular opening  $o^2$ , which in turn communicates with a central or common chamber  $i^2$ , provided with the exit-pipe  $z$ . The openings  $o^2$  extend entirely across the cylinder at the ends. These openings may be rough-finished, thereby saving the cost of



planing. To the exhaust-opening is roughly fitted a removable seat  $t$ , provided with ports  $t'$ , having an area equal to or exceeding those  $v'$  of the valve. The seat is planed out longitudinally to receive the exhaust-valve  $v$ , which is nicely fitted to travel therein. A thin plate or ported cover  $p$  is fitted into the top of the seat  $t$ , the same being so constructed and arranged that live steam is excluded from the valve when the exhaust-ports are closed, (see Fig. 3,) yet permitting a free exit of the exhaust-steam at the proper time—that is, when the openings  $p'$  of the cover coincide with those of the valve and seat. The cover and seat are of the same length, the valve obviously being necessarily somewhat shorter. Bonnets  $h$   $h$  are fitted at the ends of the exhaust-chest, as usual, the rear ones being provided with stuffing-boxes, through which the valve-rods  $n$  pass.

The drawings represent a somewhat novel arrangement for operating the exhaust-valves.  $c'$ , Figs. 1 and 2, indicates a mounted rocker-shaft having a lever  $l'$  secured thereto, the same being adjustably connected to the exhaust eccentric  $e$ , secured to the continuously-revolving shaft  $c$ , before described. An adjustably-secured lever  $l$  at each end of the rocker-shaft, jointed to a short link connected with the valve-rod  $n$ , serves to reciprocate the valve back and forth in unison with the eccentric's movement.

The two vertical sides of the removable seat  $t$  are provided each with a groove along the upper edge to receive a packing  $w$ , as shown in Fig. 4. The grooves are filled with a packing composed, say, of metal chips or filings, although other suitable material may be employed, the packing  $w$  forming a steam-tight joint between the adjacent surfaces of the cylinder and seat. After the seat is in position the valve  $v$  is introduced endwise, followed by the insertion of the covering-plate  $p$ , the bonnets  $h$  being finally placed in position and bolted.

From the foregoing it is obvious that not only is the labor of fitting the seat, &c., to the cylinder greatly reduced, but a considerable saving of live steam is effected, as the plate  $p$  prevents the steam from filling the ports  $v'$  until the release due to the movement of the exhaust-valve occurs, which brings simultaneously the three sets or series of ports in communication with each other and the cylinder, thus allowing the exhaust-steam to freely pass into the exit-pipe  $z$ .

In Fig. 6 the exhaust-seat and cover combined have a cylindrical form, the exhaust-chest obviously having a circular opening extending through it transversely for their reception. The construction and arrangement of the parts are substantially the same as before described.

I do not limit my invention to a steam-cylinder provided with releasing valve-gear substantially as shown and described, nor to exhaust-valves operated as described, as it is apparent that my improved valve-seat, with its cover  $p$ , adapted to receive between them a gridiron-valve, may be used on other slide-valve engines having different valve-gear, &c., without departing from the spirit of my invention.

What I claim as my invention, and desire to secure by United States Letters Patent, is—

1. A steam-engine cylinder having a multiported exhaust-valve arranged to travel to and fro transversely of the cylinder, a ported removable seat for the valve, and a similarly-ported removable thin plate located directly in the exhaust-passage and fitted to exclude steam from the ports of said valve when the latter is closed, substantially as hereinbefore described.

2. The combination, in a steam-engine cylinder provided with steam-valves and means for operating the same, of a ported exhaust-valve working crosswise of the cylinder, a ported removable valve-seat in which the exhaust-valve is mounted, and a ported covering-plate mounted above the valve, constructed and arranged whereby the said series of ports permit a free passage of the exhaust-steam from the cylinder to the exit-pipe and exclude live steam from the ports of the valve until the time of its release, substantially as hereinbefore described.

3. The combination, substantially as hereinbefore described, of a ported exhaust-valve seat  $t$ , adapted to be inserted transversely of a steam-cylinder, a similarly-ported insertible plate or cover, and a ported valve fitted to travel to and fro between the adjacent faces of said seat and cover, for the purpose set forth.

In testimony whereof I have affixed my signature in presence of two witnesses.

NOBLE T. GREENE.

Witnesses:

CHARLES HANNIGAN.

GEO. H. REMINGTON.